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Tuller

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(54) **LOCKING SHOE AND MOUNTING BRACKET FOR CURL SPRING WINDOW BALANCE SYSTEM**

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E05D 13/00 (2006.01)

(52) **U.S. Cl.** **16/193**; 16/197

(58) **Field of Classification Search** ..... 16/193, 16/401, DIG. 16, 197; 49/445, 447, 176, 49/181; 160/191, 192, 84.04, 170, 171
See application file for complete search history.

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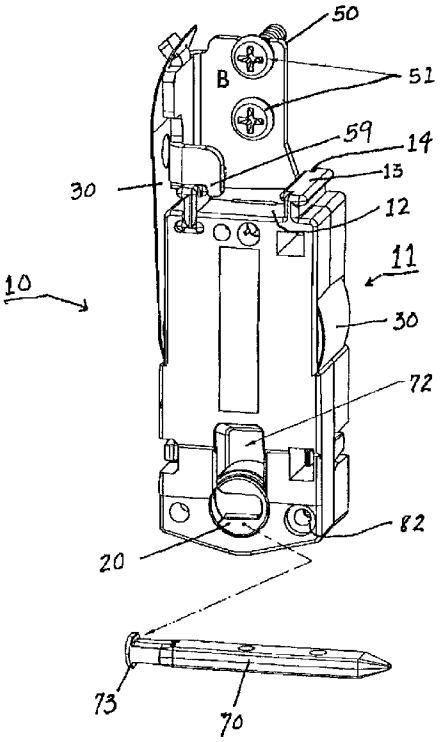
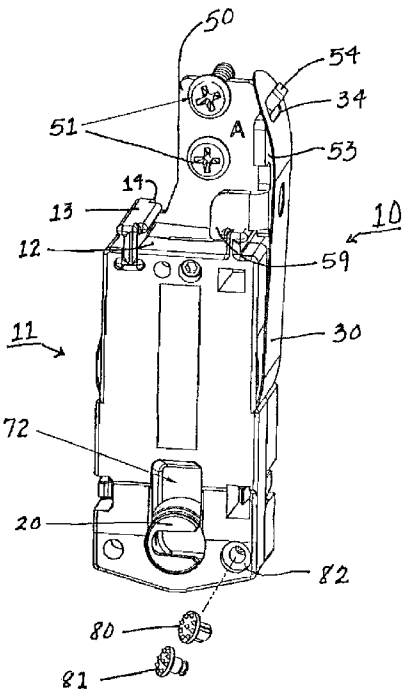
(57) **ABSTRACT**

A curl spring sash shoe cassette improves upon the suggestions of U.S. Pat. Nos. 5,353,548 and 5,463,793 by providing a mounting bracket that holds an uncurled length of the curl spring and is securely mounted on top of the shoe cassette to maintain an assembly of the shoe body, the curl spring, and the mount during shipment to a window manufacturer. The mount can receive two mounting screws to resist torque caused by curl springs and sash weight. The shoe is also improved to facilitate removal and reinsertion of sash pins into the tilt lock cams of the shoes and ensure that shoe body halves do not rotate relative to each other when sash tilting splays the body halves apart to lock them in a shoe channel.

20 Claims, 5 Drawing Sheets





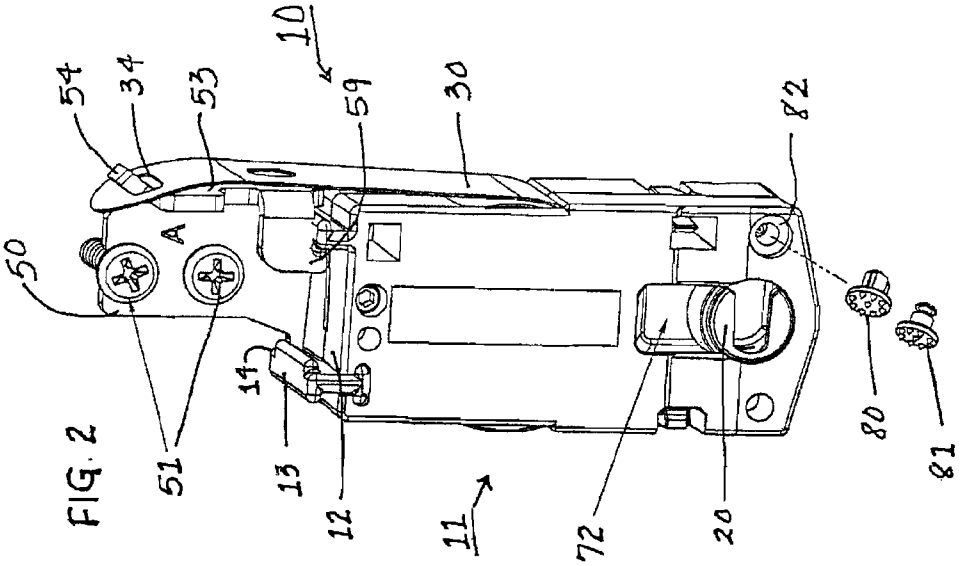

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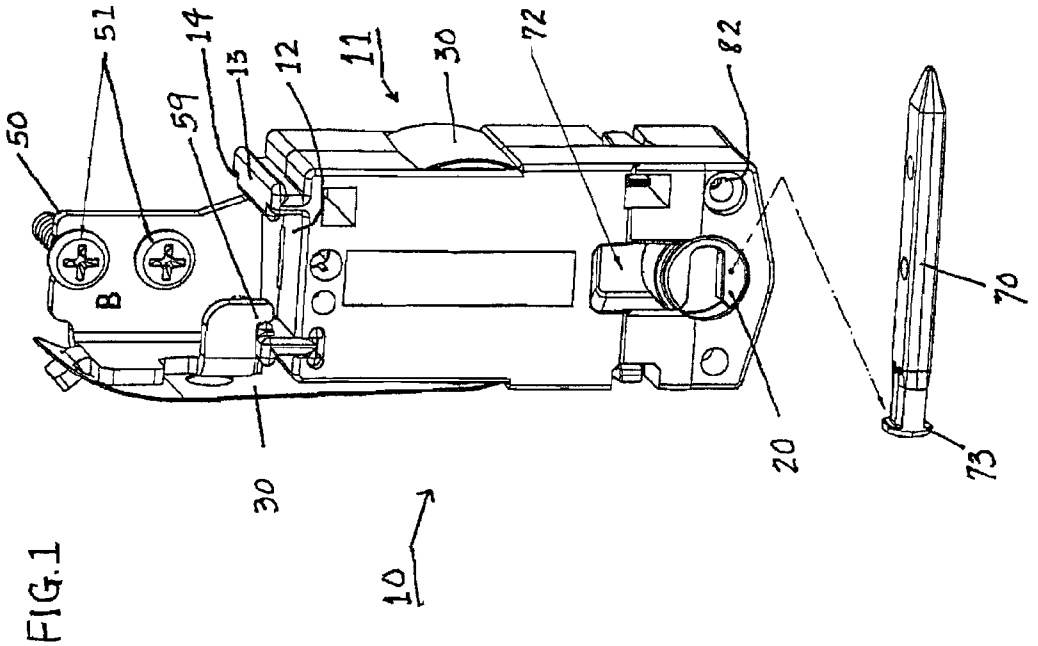
FIG. 2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10

FIG. 1

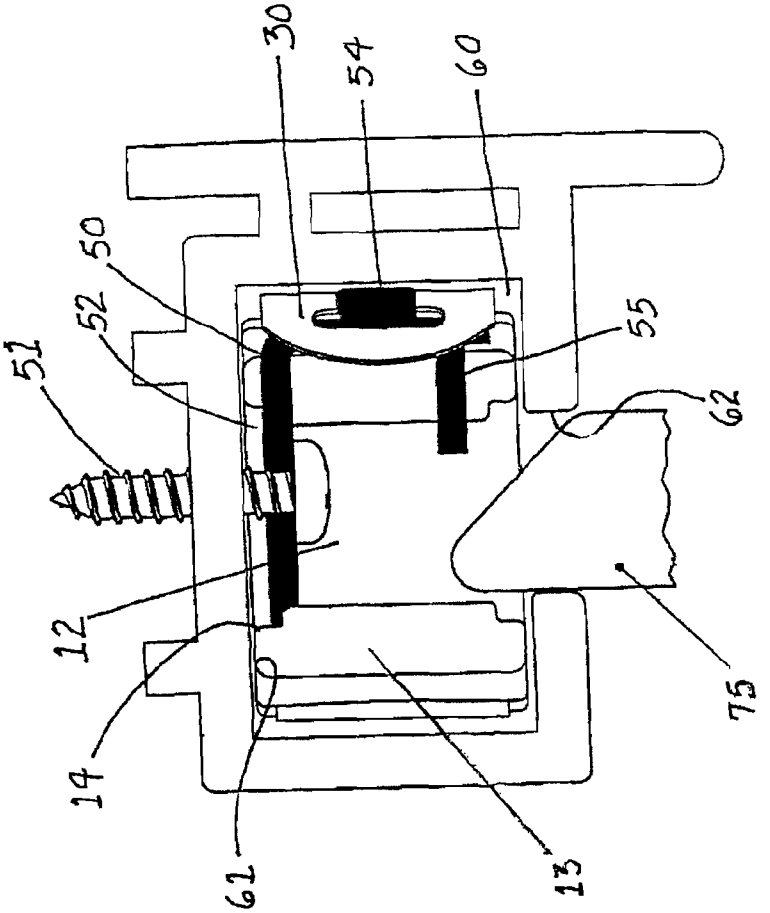
30
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FIG. 4

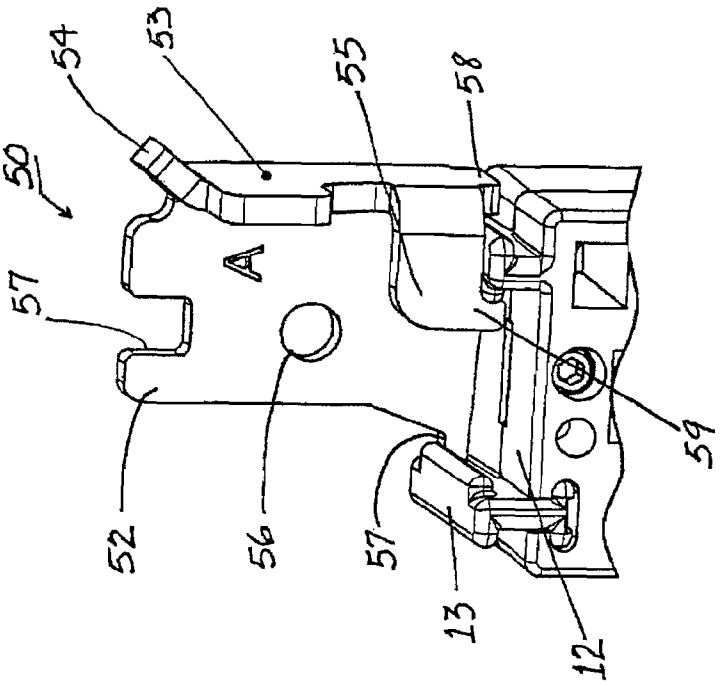
54
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FIG. 3

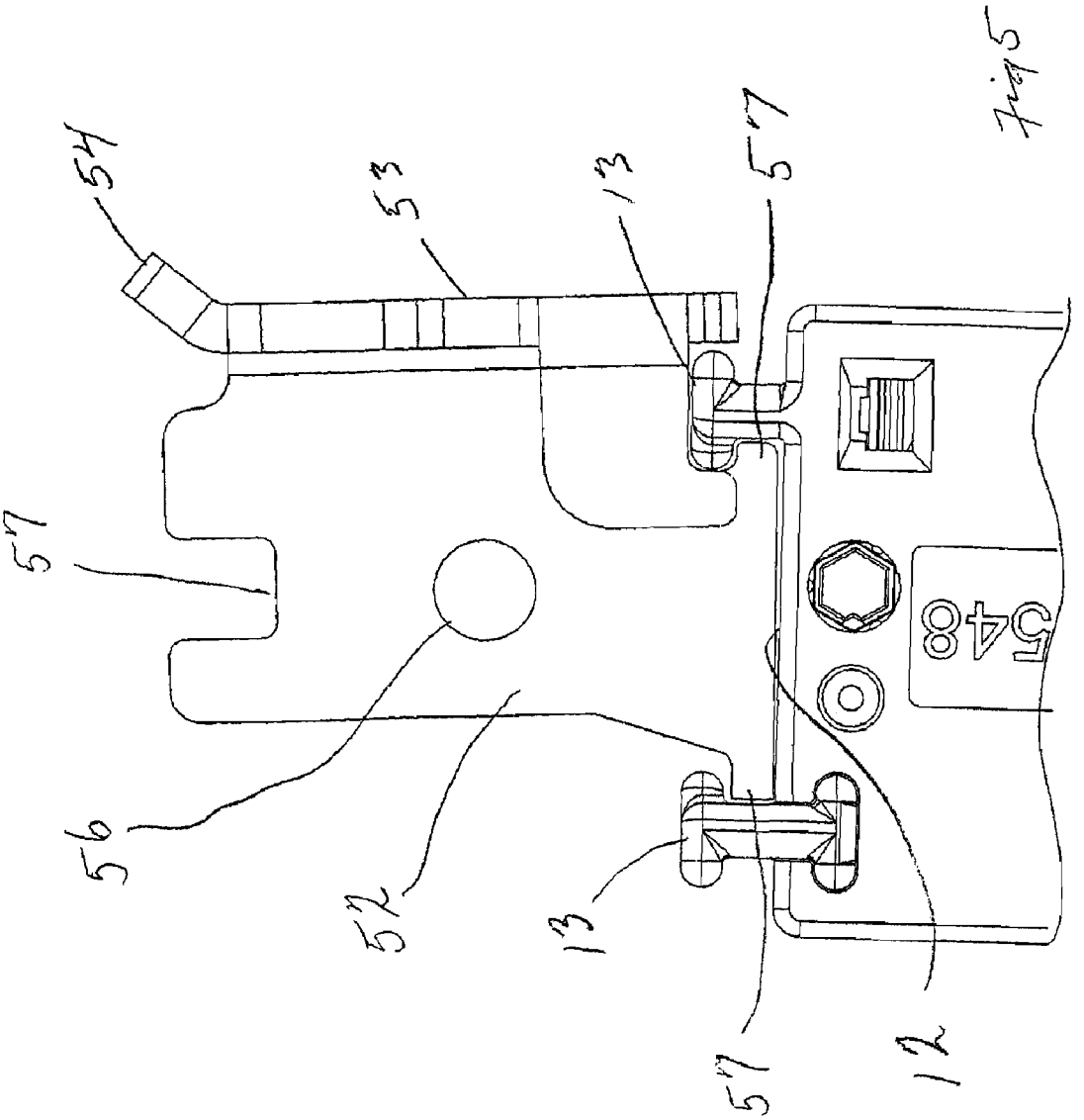
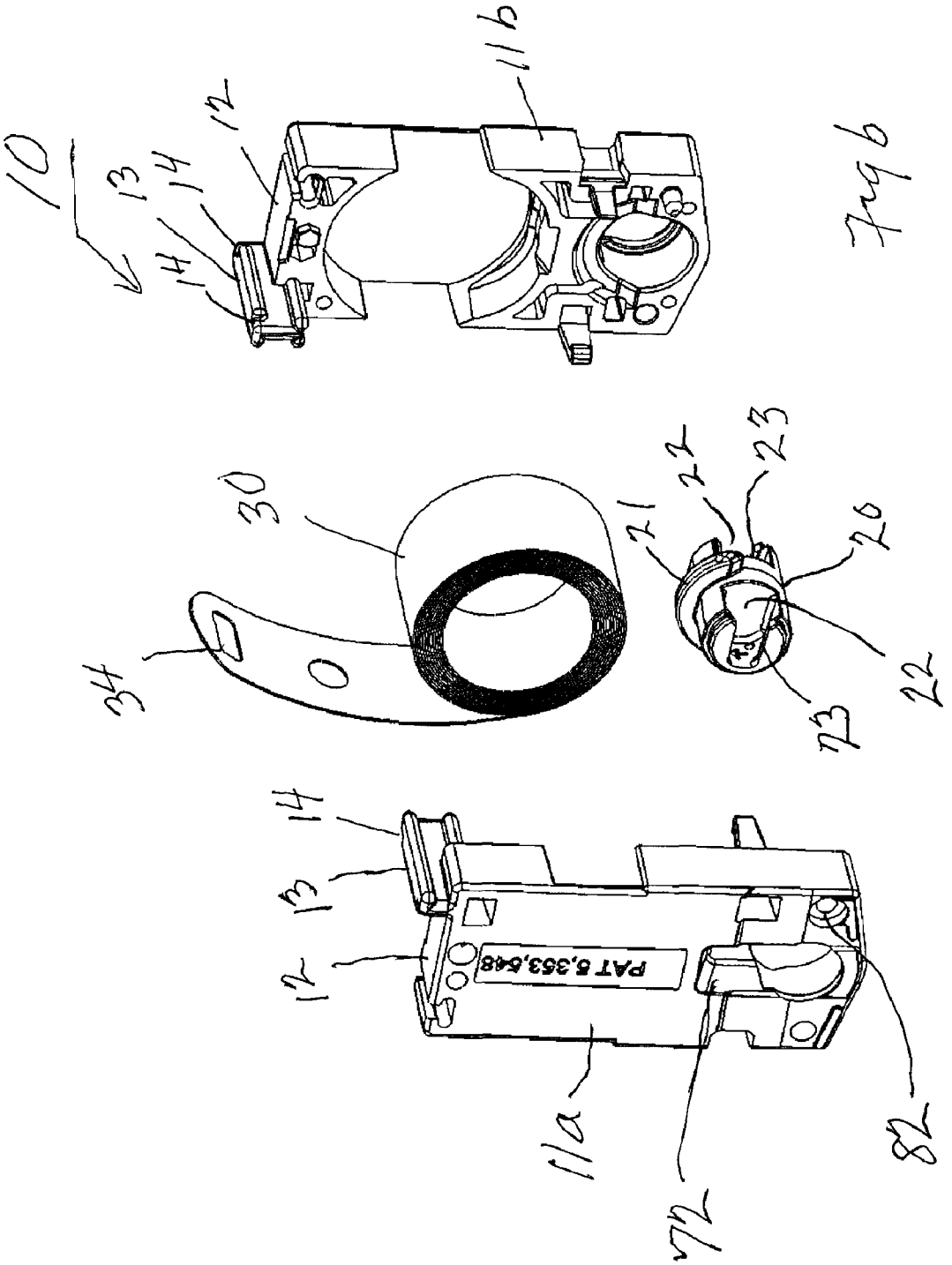


Fig 5


10
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12
11b
30
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PAT 5,353,648
11a
72
82

Fig 6

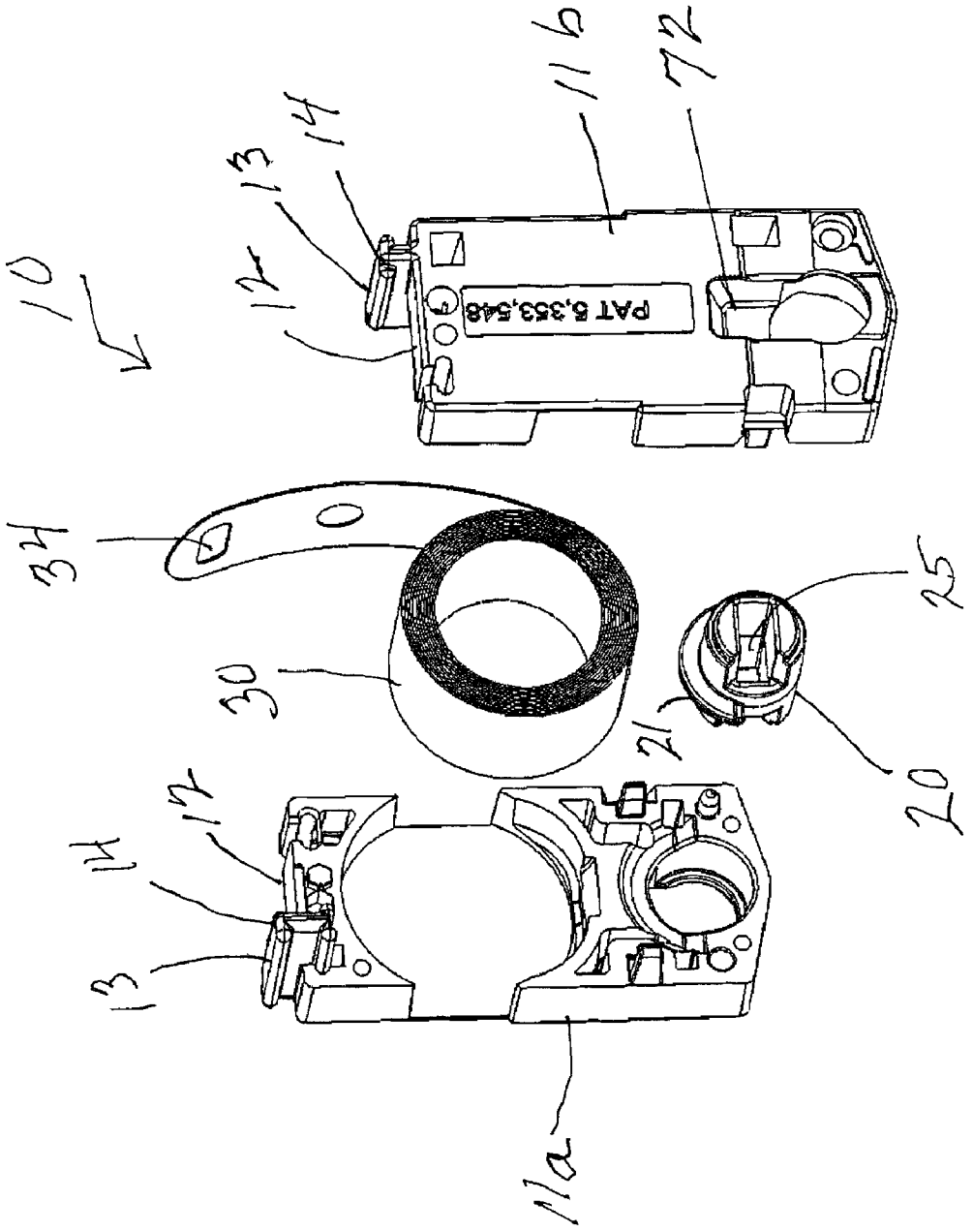

Fig 7

LOCKING SHOE AND MOUNTING BRACKET FOR CURL SPRING WINDOW BALANCE SYSTEM

FIELD OF THE INVENTION

Counterbalance systems for vertically movable window sash.

BACKGROUND

This invention improves on a locking shoe and mounting bracket usable with a curl spring window balance system such as explained in U.S. Pat. Nos. 5,353,548, and 5,463,793. The invention adds convenience and reliability to the proposals of those patents.

SUMMARY

The improvements made by this invention include a mounting bracket that can hold its position while being shipped with a shoe cassette holding a curl spring and yet can automatically disengage from the spring shoe when fastened to a sash jamb channel. The shoe cassettes are also preferably formed of identical halves that are unhanded so that a shoe cassette can be deployed on either side of a window sash. The cassette halves are preferably configured to resist relative rotation as they are splayed apart in response to cam action of a tilt lock cam contained within the shoe. The tilt lock cams can be configured to retain headed sash pins, or can have recesses or slots that allow a sash pin to extend more than half way through a locking cam. The improved system also allows locking pads to be inexpensively installed on the shoes to exert increased locking friction when a sash tilts and shoe cams lock the shoes in their channels.

DRAWINGS

FIG. **1** is an isometric view of a shoe cassette including a curl spring, a spring mount, and a sash pin to counter balance one side of a window sash.

FIG. **2** is an isometric view of a shoe cassette, including a curl spring, a spring mount, and optional locking pads to counter balance an opposite side of a window sash.

FIG. **3** is a fragmentary view of an upper region of the cassette of FIG. **2** omitting a curl spring to help illustrate a preferred configuration of shoe mount.

FIG. **4** is a fragmentary cross-sectional top view of the shoe cassette of FIG. **2** partially mounted within a shoe channel of a window jamb to illustrate how the shoe mount (in solid black) clears a tilt latch of a sash.

FIG. **5** is a fragmentary rear view of the mounting bracket and the top of the shoe cassette of FIG. **2** to illustrate how the mounting bracket mounts on the shoe body.

FIG. **6** is an exploded isometric view of the cassette of FIG. **2** showing a curl spring, locking cam, and shoe halves, without a spring mount.

FIG. **7** is an exploded isometric view reversed from the view of FIG. **6** to show that each shoe half includes a rotation resisting projection and recess, and also showing a tilt lock cam with a through channel that can receive a sash pin extending more than half-way through the cam.

DETAILED DESCRIPTION

Shoe cartridges or cassettes **10**, such as illustrated in FIGS. **1**, **2**, **6** and **7**, include shoe bodies **11** that contain curl springs **30** and locking cams **20**. Shoe bodies **11** are preferably molded in halves **11***a* and **11***b* that are identical and that fit together in an interlock allowing a lower region of the shoe bodies to expand or splay apart in response to rotation of locking cam **20**. Shoe body halves **11***a* and **11***b* are preferably interconnected at their upper regions by a pair of headed rails or ridges that are formed on each of the body halves to slide into an interconnect with the opposite body half.

An upper edge or top region **12** of shoe body **11** supports mounting bracket **50**. A short length of curl spring **30** is uncurled from shoe body **11** and is attached to mounting bracket **50**, which can hold the assembled shoe body **11**, curl spring **30**, and mounting bracket **50** together for assembly into a window or shipment to a window manufacturer.

Mounting bracket **50** improves on a simpler bracket suggested in the '548 and '793 patents. Bracket **50** is robust enough, and well enough braced and interlocked at the top **12** of shoe body **11**, to hold itself and curl spring **30** in place in an assembled cassette **10** during shipment. This provides the convenience to a window manufacturer of shoe cassettes arriving assembled with mounting bracket **50** ready to secure each cartridge in a shoe channel of a window jamb. All that is necessary is to slide each cassette into a shoe channel to the mount position, and then drive in one or two fastening screws **51** to fasten mounting bracket **50** in place. Two fasteners or mounting screws **51** are preferred so that mounting bracket **50** can resist a torque or turning force applied by curl spring **30**. In some jamb channels, mounting bracket **50** can be blocked from rotation by channel walls, making a single mounting screw **51** all that is necessary for securely holding mounting bracket **50** in place.

To accomplish its improvements, mounting bracket **50** preferably includes mounting wall **52**, spring holding wall **53**, and brace **55**, as best shown in FIGS. **3**,**4** and **5**. Mounting wall **52** is preferably flat so that it can be fastened snuggly against back wall **61** of shoe channel **60**. Mounting wall **52** also includes a hole **56** or a hole **56** and a slot **57** to receive one or two mounting screws **51**. Spring holding wall **53** includes a projection **54** oriented to fit into an opening **34** in curl spring **30**, which exerts a downward pull on mounting bracket **50** to hold spring **30**, mount **50**, and body **11** in the assembled position illustrated in FIGS. **1** and **2**. Spring holding wall **53** is preferably normal or perpendicular to mounting wall **52**, and brace **55** preferably extends normal or perpendicular to spring holding wall **53** and parallel with mounting wall **55**. The interrelationship between walls **52** and **53** and brace **55** cooperates with the downward bias of spring **30**, to securely support mount **50** on the top **12** of shoe body **11**.

The top or upper surface **12** of shoe body halves **11***a* and *b* preferably include headed ridge or "dog bone" shaped connectors **13** that hold shoe body halves **11***a* and *b* together in proper alignment. Connectors **13** also allow a superposed attachment of an additional curl spring container mounted on top of shoe body **11**. The headed rail connectors also provide a sturdy interlock with mount **50**, as shown in FIG. **5**.

Mounting wall **52** preferably has an opposed pair of projections **85** that extend under headed connectors **13** to prevent mounting bracket **50** from pivoting out of its position on the top **12** of body **11**. The projection **85** that is farthest from spring holding wall **53** is especially well positioned to prevent this. Spring holding wall **53** has a downwardly extending projection **58** that overlaps with the adjacent dog bone connector **13**. Brace **55** rests on top of a connector **13**, and has a projection **59** (FIGS. **1-3**) that hooks over an edge of the connector **13** on which it rests. All these features ensure that mounting bracket **50** stays reliably in place on top of shoe

body **11**, especially when curl spring **30** provides a downward force pulling mounting bracket **50** downward against the top of shoe body **11**.

Headed rail connectors **13** have end notches **14** that allow mounting wall projections **85** to escape from under connectors **13** when mounting wall **52** is fully attached flat against back wall **61** of shoe channel **60**. In the position of mounting bracket **50** as illustrated in FIG. **4**, mounting screw **51** has not been tightened enough to draw mounting bracket **50** snugly against back wall **61** of shoe channel **60** so that mounting bracket **50** has not yet escaped from shoe body **11** via notches **14** in the ends of connector rails **13**. Tightening screw **51** beyond the position illustrated in FIG. **4** to draw mounting wall **52** snugly against panel wall **61** then moves projections **85** into notches **14** of connectors **13**, which allows mounting bracket **50** to escape or separate from the top **12** of shoe body **11**. In practice, this separation occurs when shoe body **11** is pulled downward after mounting bracket **50** is fully secured within channel **60**. In effect, the sturdy interlock between mounting bracket **50** and shoe body **11** that allows shipment of assembled cassettes as illustrated in FIGS. **1** and **2** also automatically disconnects mounting bracket **50** from cassette body **11** when mounting bracket **50** is fully secured in place in a shoe channel **60**.

Since mounting bracket **50** is preferably free to slide along top surface of shoe body **11** when fastened into a shoe channel, as described, it is desirable to allow relative movement between curl spring **30** and spring holding projection **54**. Relative movement at the interconnection between spring **30** and projection **54** allows mounting bracket **50** to slide into mounted position without pulling spring **30** laterally out of its alignment with shoe body **11**. A preferred way of accomplishing such relative movement is to make hole **34** in spring **30** an oval or oblong hole or slot, as best shown in FIGS. **6** and **7**. Projection **54** can then move laterally within oblong hole or slot **34** to leave spring **30** in its aligned position relative to body **11** while mounting bracket **50** slides laterally into a released position engaging wall **61** of a shoe channel.

As best shown in FIG. **6**, locking cam **20** preferably has sash pin channels or slots **22** arranged on opposite sides of an annular cam **21**. Each of the cam slots **22** preferably has in turned walls **23** that can capture a head **73** of a sash pin **70** (illustrated in FIG. **1**). It is also possible, and is preferred in some situations, for locking cam **20** to have a through recess or channel **25** that allows a sash pin to extend more than half way into locking cam **20** (shown in FIG. **7**). A through channel **25** in cam **20** allows a sash pin to penetrate deeply into cam **20** and is preferred to increase the wind resistance of a sash.

Each body part **11***a* and *b* preferably has a recess **72** formed above the end regions of cam **20**. When a sash supported by cassettes **10** is tilted out of the window plane, cam **20** turns to a locking position that aligns its channel **25** or slots **22** with recesses **72**. This allows the heads **73** of sash pin **70** to be raised upward from cam slots **22** or channel **25** and into recesses **72** to facilitate removing a tilted sash from a window.

Recesses **72** also facilitate replacing a removed sash, because recesses **72** allow extra room above cam **20** to receive sash pin **70** that can then be dropped down into cam slots **22** or **25**. Recesses **72** also provide a somewhat larger area for maneuvering sash pins **70** into shoe bodies **11***a* and *b* before dropping downward into cam channels **25** or slots **22**. The sash pins **70** can have heads **73** that interlock with cam edges **23** to prevent withdrawal of sash pin **70** from shoe cassettes **10** if a window is carried in a suitcase fashion before installation. Sash pins **70** can also be un-headed and long enough to extend deeply into cam **20** for improved wind resistance of a sash. The described arrangement of cam channels **22** and **25**, recesses **72**, and sash pins **70** also allows shoes **11** to be unhanded, so that any shoe can be installed on either side of a sash to be counterbalanced.

Mounting brackets **50**, to the contrary, are preferably handed so that each bracket is arranged to be mounted on only one side of a sash. This preference is to assure that mounting brackets **50** do not interfere with tilt latches of a counter balanced sash. FIG. **4** illustrates one way that this can be accomplished. Tilt latch **75**, which is typically spring loaded to be snapped into latching engagement with channel slot **62** when a tilted sash is moved back to an upright position, runs in slot **62** of channel **60** where it moves up and down with sash **50** to prevent accidental tilting. When latches **75** are moved inward against their spring bias, they allow deliberate tilting of a counter balanced sash.

Brace **55** of mounting bracket **50** is preferably mounted in an orientation that clears tilt latch **75** so that mounting bracket **50** does not interfere with vertical movement of tilt latch **75** past mounting bracket **50**. The left- and right-handedness of mounting bracket **50** as identified by the A and B markings appearing on mounting brackets **50** in FIGS. **1** and **2** ensures that a mounting bracket on each side of a window sash clears the tilt latch **75**.

Lower corners of body parts **11***a* and *b* preferably have molded recesses **82** that can receive locking pads **80** or **81** to increase a frictional locking effect when a balanced sash tilts to pivot cam **20** to a locking position. Locking pads **80** and **81** (schematically shown in FIG. **2**) are alternatives that can be pressed into a recess **82** to achieve a pressed fit in recess **82** for locking pad **80** or a snap fit in recess **82** for locking pad **81**. Pads **80** and **81** can be surfaced with different materials and given different surface configurations to increase the frictional security of a shoe lock achieved by pivoting of cam **20** to spread shoe bodies **11***a* and *b* somewhat apart within channel **60**.

When locking cam **20** pivots with a tilted sash, its cam surface **21** slides in between lower edges of shoe bodies **11***a* and *b* to splay the shoe bodies apart and lock the shoe cassette in place in a jamb channel. This splaying apart of the lower regions of shoe bodies **11***a* and *b* also produces a force that tends to rotate the shoe bodies relative to each other as they are forced apart by cam surface **21**. Such rotation would tend to diminish the splaying apart of the shoe body halves, and this tendency is overcome by projections **15** and corresponding recesses **16** that are formed in the lower region of each shoe half. As bodies **11***a* and *b* splay apart in response to rotation of cam surface **21**, projections **15** remain engaged with recesses **16** to prevent any relative rotation between shoe halves **11***a* and **11***b*. Recesses **16** can be formed as inward facing parts of recesses **82** whose outward facing parts can receive locking pads **80** or **81**. Projections **15** and recesses **16** are also preferably alternately formed on each body half **11***a* and *b* so that these halves remain identical to each other while providing a pair of mating recesses **16** and projections **15**.

What is claimed is:

1. In a window sash counterbalance shoe containing a curl spring disposed with curled convolutions in the shoe and an uncurled length extending to a bracket mounted on a top of the shoe to support the uncurled length of the curl spring during shipment, the bracket having a mounting wall disposed so that a mounting screw can pass through the mounting wall and secure the mounting bracket to a back wall of a shoe channel, the improvement comprising:

the mounting bracket having a spring holding wall normal to the mounting wall and disposed to rest on a top surface of the shoe above which the uncurled length of curl spring extends;

the spring holding wall and the uncurled length of curl spring being configured to interengage so that the uncurled spring length is held by the spring holding wall;

the spring holding wall extending approximately for the width of the curl spring along an edge of the top surface of the shoe so that the spring holding wall and the mounting wall cooperate to resist a pull exerted by the uncurled length of the curl spring; and

a brace extends normally from the spring holding wall so that the brace engages the top surface of the shoe in a region spaced from and parallel with the mounting wall.

2. The improvement of claim **1** wherein the mounting wall of the bracket is formed with holes or slots to receive one or two mounting screws to prevent rotation of the mounting bracket from spring force exerted during window operation.

3. The improvement of claim **1** wherein an interlock between the mounting bracket and the top surface of the shoe is configured to release the mounting bracket from the shoe automatically when the mounting bracket is secured to a back wall of the shoe channel.

4. The improvement of claim **3** wherein the spring holding wall has a projection engaged in a laterally extending aperture in the uncurled length of the curl spring to allow the mounting bracket to move laterally of the shoe and the curl spring when the mounting wall is secured to the back wall of the shoe channel.

5. The improvement of claim **1** wherein the mounting bracket is formed in right- and left-hand versions for deployment respectively on right- and left-hand sides of a sash to be counterbalanced so that right- and left-hand tilt latches of the sash respectively clear the right- and left-hand mounting brackets.

6. The improvement of claim **1** wherein the top surface of the shoe has a pair of headed ridges, and the mounting wall has opposed projections that interlock under the headed ridges.

7. The improvement of claim **6** wherein the headed ridges have end notches that automatically release the mounting wall projections when the mounting wall moves laterally of the top surface of the shoe as the mounting wall is secured to the back wall of the shoe channel.

8. A curl spring counterbalance shoe and mounting bracket combination comprising:

the mounting bracket having a mounting wall that in a shipping position engages a top surface of a shoe containing curled convolutions of a curl spring;

the mounting bracket having a spring holder wall perpendicular to the mounting wall and also engaging the top surface of the shoe in the shipping position;

an uncurled length of the curl spring extending up one side of the shoe and along a face of the spring holder wall;

the uncurled length of the curl spring being attached to the spring holder wall so that the mounting wall and the spring retainer wall each resist a portion of the recurl force applied to the mounting bracket by the uncurled length of the curl spring;

the mounting bracket being interlocked with the top surface of the shoe so that the mounting bracket, when attached to the curl spring, is retained on the top surface of the shoe during shipment of the shoe, spring, and mounting bracket; and

a brace extends from the spring retainer wall parallel with the mounting wall so that the brace engages the top surface of the shoe spaced from the mounting wall and helps support the spring holder wall against a force exerted by the uncurled length of the curl spring.

9. The combination of claim **8** wherein the mounting bracket is configured to receive two mounting screws to retain the mounting bracket against rotation during sash operation.

10. The combination of claim **8** wherein the mounting bracket is handed so that one configuration of the mounting bracket is arranged on a right side of a sash and an opposite configuration of the mounting bracket is arranged on a left side of the sash, and the mounting brackets, when so arranged, provide clearance for movement of tilt latches on the sash.

11. The combination of claim **8** wherein the mounting bracket and the top surface of the shoe are configured to interlock during shipment and to release the mounting bracket from the shoe automatically when the mounting bracket is mounted in the shoe channel.

12. The combination of claim **11** wherein the top surface of the shoe has parallel headed ridges that interlock with opposed projections of the mounting wall, and notches in heads of the ridges allow the automatic release of the mounting bracket from the shoe when the mounting bracket moves laterally of the shoe during its mounting to the shoe channel.

13. The combination of claim **8** wherein the uncurled length of the curl spring has an aperture engaging a projection on the spring holder wall, and the aperture is laterally wider than the projection to allow the bracket to move laterally of the top surface of the shoe while the projection remains engaged within the aperture.

14. The combination of claim **8** wherein the mounting bracket is formed in right- and left-hand versions for deployment respectively on right- and left-hand sides of a sash to be counterbalanced so that right- and left-hand tilt latches of the sash respectively clear the right- and left-hand mounting brackets.

15. A curl spring shoe and mounting bracket combination comprising:

the mounting bracket in a shipping position having a mounting wall interlocked with a top surface of the shoe;

a spring retainer wall perpendicular to the mounting wall being oriented to align with a side of the shoe from which an uncurled length of curl spring extends upward above the top surface of the shoe;

the spring retainer wall and the uncurled length of the curl spring being configured to interconnect so that the spring retainer wall holds and supports the uncurled length of the curl spring above the top surface of the shoe during shipment;

the interlock of the mounting wall with the top surface of the shoe allowing lateral movement of the mounting bracket along the top surface of the shoe;

the mounting wall interlock with the top surface of the shoe being released when the mounting wall moves laterally into engagement with a back wall of the shoe channel where the mounting wall is secured; and

a brace spaced from and parallel with the mounting wall extends perpendicularly from the spring retainer wall to engage the top surface of the shoe to help support the spring retainer wall against a force exerted by the uncurled length of the curl spring.

16. The combination of claim **15** wherein the mounting wall is configured to receive two mounting screws to resist rotational force applied by the curl spring.

17. The combination of claim **15** wherein the spring retainer wall has a projection that fits into an oblong hole in the uncurled length of the curl spring so that the projection can move laterally within the hole when the bracket moves laterally to release the interlock with the top surface of the shoe.

18. The combination of claim 15 wherein the top of the shoe is formed with a pair of headed rails, and the mounting wall is formed with a pair of opposed projections interlocked under heads of the rails.

19. The combination of claim 15 wherein end notches in the rail heads automatically release the interlock with the mounting wall when the bracket is moved laterally for attachment to the back wall of a shoe channel.

20. The combination of claim 15 wherein the bracket is formed in right- and left-hand versions for deployment respectively on right- and left-hand sides of a sash to be counterbalanced so that right- and left-hand tilt latches of the sash respectively clear the right- and left-hand mounting brackets.

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